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ABSTRACT

Types of hierarchies of pronunciation difficulty are discussed, and a hierarchy based on contrastive analysis plus informal observation is proposed. This hierarchy is less one of initial difficulty than of error persistence. One feature of this hierarchy is that, because of lesser learner awareness and very limited functional load, errors involving allophones are more persistent than errors involving phonemes. Phonetic difficulty and suprasegmental and spelling interference are aggravating factors that increase the relative difficulty of particular problems in the hierarchy. To test the proposed hierarchy and three other hypotheses, a thorough pronunciation test was administered to 50 English-speaking students of Spanish (almost all of whom also knew some French). The test was given at the end of 45 hours of mostly oral instruction, which included 4 to 5 hours of specifically pronunciation instruction. The resulting data formed the basis for error analysis. The results generally confirmed the proposed hierarchy; they also showed the "sacredness" of word boundaries for speakers of English, the negative effects of spelling on pronunciation, greater frequency of errors in cognate than in non-cognate words, evidence of suprasegmental interference, and more frequent errors with known words than with unknown words. Conclusions include several suggestions for the teaching of Spanish pronunciation. (Author/CLK)

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THE RELATIVE FREQUENCY OF SPANISH PRONUNCIATION ERRORS

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Hierarchies of pronunciation difficulty can be established in two ways: they are a priori when they are based on a theoretical comparison of two sound systems and a posteriori when they are the result of error analysis.

An example of a hierarchy established a priori (although it was also partly based on informal observations over a period of several years) is that of Stockwell and Bowen.[1] Substituting the words allophone for "obligatory" and phoneme for "optional," the first six problems in their hierarchy, in order of decreasing difficulty, are:

Order	English	Spanish
1	∅	allophone
2	∅	phoneme
3	phoneme	allophone
4	allophone	phoneme
5	allophone	∅
6	phoneme	∅

CHART I

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An example of a hierarchy of difficulty made a posteriori is that established by Brière[2] after teaching monolingual English speakers a composite "language" made up of Arabic, French, and Vietnamese utterances. He found no correlation between the frequency of occurrence of a phoneme and its position in the hierarchy of difficulty. He found the order

of difficulty for fourteen sounds to be the following:

1 (easiest).....[ž, ɛ]

2.....[ey, x]

3.....[e, t]

4.....[h, ɛ̃, ŋ, ü, ɛ, t]

5 (hardest).....[ï, ḥ (laryngeal fricative)]

He concluded, among other things, that the syllable is better than the word as a basis for contrastive analysis; that foreign sounds with close native counterparts are easier to learn than those without such equivalents; and that a prediction of a hierarchy of difficulty must be based on information at the phonetic level.

The author, on the basis of contrastive analysis plus the informal observation of Spanish pronunciation errors over a period of fourteen years, proposes the following a priori tentative list of types of phonological interference in decreasing order, not of initial difficulty, but of persistence as a source of errors (that is, difficulty in the long run):

Order	Native Language	Second Language	phonetic difficulty	suprasegmental interference	spelling interference
1	allophone	∅			
2	different distribution or function of native language allophones				
3	∅	allophone			
4	∅	phoneme			
5	different distribution or function of native language phonemes				
6	phoneme	∅			

CHART II

Examples (from English as the native language and Spanish as the second language):

1. English [pʿ, tʿ, kʿ], aspirated in initial position.
2. English flapped [t̆] and [d́], phonetically identical to Spanish [ř].
3. Spanish [ɡ] and [b̆].
4. Spanish /ř/ and /ñ/ (also /x/ in some dialects).
5. English /ð/, phonetically acceptable as the [đ] allophone of Spanish /đ/.
6. English /æ/, /ə/, /v/, etc.

Phonetic difficulty: new Spanish /ř/, a totally new type of articulation, much harder than new Spanish /ñ/, the conjoining of two known articulations, /n/ and /y/.

Suprasegmental interference: English tendency for /ə/ to appear in unstressed syllables; this explains why [ə] is by far the English sound most intruding in Spanish.

Spelling interference: Spanish «v», «h», etc.

(The reason why allophonic problems are more difficult than phonemic ones is that the correct use of allophones is not as important for communication as that of phonemes; as a result of their being functionally less important, more errors are made with them. The reason why stopping the use of native language --NL-- allophones is harder than learning new second language --SL-- allophones is that, while NL allophones are mostly below the level of awareness and are used automatically, the learner can be more easily made phonetically aware of SL

allophones. On the other hand, learning a SL phoneme is harder than stopping the use of a NL phoneme, because the former involves perceptual and articulatory difficulties, while the latter merely means that the speaker must stop using a sound of which he is well aware.)

Several scholars have pointed out that pronunciation errors can only be partially predicted through contrastive analysis and that error analysis should therefore be used as the main predicting tool. Ideally, such studies would be based on spontaneous speech; this, however, would require a very large sample if it is to include all problems. Such a sample would be very difficult to obtain if the subjects are beginning language students; and even if it could be obtained, it would include a very high percentage of repetitive material.

A solution to this problem is to obtain, by means of a test, a sample containing the problems that can be predicted by contrastive analysis plus any other problems that may have been observed in the course of teaching. Such a test, administered at different points in a language program, would give a good idea of the nature, prevalence and persistence of errors.

The rest of this article is a discussion of such a test and its results when it was administered to students of Spanish after nine weeks (--45 hours--) of instruction with an oral emphasis.

METHOD

Subjects

The subjects were the 62 students in the first semester Spanish course at the end of its ninth week. Although the

pronunciation test was administered to all, the analysis of the results was based on the pronunciation of 50 students, nine not being considered because their native language was not English and three being eliminated at random. Still, the subjects were not absolutely monolingual, since almost all of them had taken several years of secondary school French, a requirement in British Columbia for students planning to enroll in a university.

Instruction

The method of language instruction was "cognitive audiolingual," that is, audiolingual with grammatical explanations and discussion preceding the study of each grammatical point. Instruction in pronunciation took place during the first eight weeks of the course and consisted of selected exercises from Bowen and Stockwell's Drillbook,[3] in periods of ten to fifteen minutes, two or three times a week, for a total of four to five hours during the eight weeks. In addition, most of the students had a copy of the Drillbook and practiced Spanish pronunciation patterns further in the language laboratory, where several copies of tape recordings based on the Drillbook were available. There was no prereading period, so the students read orally-learned materials in standard Spanish spelling from the first day of classes. The instructors were native speakers of Latin American Spanish.

Test

The pronunciation test had four parts, all of which were recorded on tape at 7 1/2 i.p.s. In Part A the students

imitated known words and phrases. In Part B they imitated unknown words and phrases. In Part C they read aloud (after a silent reading) known words and phrases. In Part D they read aloud (again after a silent reading) unknown words and phrases. The students had no way of knowing which sound or sounds were being tested in each word or phrase.

A total of 45 pronunciation problems were tested, all dealing with segmental phonemes, some of which appeared in several environments. Most pronunciation problems were presented in the four parts, but some appeared in only three or even two parts of the test.

HYPOTHESES

(1) The first hypothesis was that the errors would group themselves by type in the order of difficulty given in Chart II on page 2.

(2) Secondly, it was hypothesized that due to the interference of spelling on pronunciation, already shown clearly in another study,[4] there would be more errors in parts C and D (reading aloud) than in parts A and B (imitating) of the test.

(3) Another hypothesis was that problem sounds in cognate words would be mispronounced more often than those in non-cognate words.

(4) The fourth and final hypothesis was that the sounds tested in known words and phrases (parts A and C) would be mispronounced more frequently than the same sounds in unknown words and phrases (parts B and D); the reason for this belief was the observation that once students adopted an utterance as

their own, they used it without much attention to its phonic detail and according to a neither-English-nor-Spanish pronunciation parasystem, while they paid more careful attention to the phonic detail of unknown utterances.

RESULTS[5] AND DISCUSSION

Problems in Decreasing Order of Difficulty

The 45 problems treated in the test appear, in order of decreasing difficulty, in Chart III on pages 8-14. First it should be noted that the 45 problems presented are by no means all the potential pronunciation problems of an English speaker learning Spanish. Many problems have been left unexplored and could be the subject of another study; for example: /r̆/ does not appear after /n/ or after a stressed vowel, /đ/ does not appear in final position, and only three of the many possible reductions of Spanish vowels to English [ə] have been studied.

Examples of errors due to spelling abound. Compare, for instance, parts C and D with A and B in problems 23, 25 and 35. Spelling-interpretation errors may show in the different types of errors in the various parts of a problem: compare 8D with 8B, and 37 C and D with 37 A and B. Spelling interference, however, may vary according to the environment in which a letter appears; thus <v> causes a .67 mean error in word-medial position (problem 2 --compare with problem 21) but only a .03 mean error in initial position (problem 45).

An example of greater difficulty with known than with unknown words is problem 28, where there were more errors in part A than part B and also more errors in part C than part D.

PROBLEMS IN DECREASING ORDER OF DIFFICULTY

Order	Problem	Example	A Imitation of known words	B Imitation of unknown words	C Reading aloud of known words	D Reading aloud of unknown words	Mean Error
1	k͡	¿Qué...?	k..... .06 kʿ..... .94	k..... .04 kʿ..... .96	k..... .24 kʿ..... .76	k..... .08 kʿ..... .84 kw..... .08	.90 (kʿ.... .88)
2	word-medial ‹v› as [b̞]	favor	b̞..... .04 v..... .86 b..... .10		b̞..... .16 v..... .54 b..... .30	b̞..... .14 v..... .62 b..... .24	.89 (v..... .67)
3	/n/→/m/ before |/p/	un papel	m..... .30 n..... .70		m..... .06 n..... .94	m..... .04 n..... .92 ṽ..... .04	.87
4	p͡	pasa	p..... .20 pʿ..... .78 b̞..... .02	p..... .26 pʿ..... .74	p..... .10 pʿ..... .90	p..... .12 pʿ..... .88	.83
5	t͡	tía	t..... .16 tʿ..... .82 kʿ..... .02	t..... .16 tʿ..... .84	t..... .18 tʿ..... .82	t..... .20 tʿ..... .78 d..... .02	.83 (tʿ.... .82)
6	word-initial ‹b› as [b̞]	está bonita	b̞..... .28 b..... .72		b̞..... .26 b..... .74	b̞..... .00 b..... 1.00	.82
7	word-initial ‹d› as [d̞]	tu disco	d̞..... .24 d..... .48 ř..... .28		d̞..... .08 d..... .90 ř..... .02	d̞..... .30 d..... .68 ř..... .02	.80

Order	Problem	Example	A	B	C	D	Mean Error
8	/áw/ as [aw̄], not [aw̰] etc.	aula		aw̰..... .44 aw̰..... .48 other... .08		aw̰..... .00 o..... .80 other... .20	.78 (Note: there were no known words with Sp. /áw/)
9	final /o/ as [o], not [ow̰]	periódico	o..... .22 ow̰..... .78	o..... .22 ow̰..... .78	o..... .26 ow̰..... .74	o..... .24 ow̰..... .76	.77
10	word-initial ‹g› as [g]	me gusta	g..... .50 g..... .48 h..... .02		g..... .16 g..... .84	g..... .08 g..... .90 x..... .02	.75
11	final /é/ as [e], not [eɪ̰]	no sé	e..... .14 eɪ̰..... .84 ɪ:..... .02	e..... .16 eɪ̰..... .84	e..... .36 eɪ̰..... .64	e..... .36 eɪ̰..... .64	.75
12	/VsV/ as [s], not [z], in cognates	visita	s..... .22 z..... .78	s..... .20 z..... .80	s..... .24 z..... .76	s..... .46 z..... .54	.72
13	word-initial ‹r› as /r̃/	la risa	r̃..... .24 ř..... .40 ɹ..... .12 ɹř..... .16 hř..... .06 R..... .02	r̃..... .28 ř..... .22 ɹ..... .02 ɹř..... .08 hř & Xr. .06 R..... .16 Rr̃..... .04 Rř..... .14	r̃..... .28 ř..... .38 ɹ..... .24 R..... .10	r̃..... .32 ř..... .32 ɹ..... .24 ɹř..... .02 R..... .06 Rř..... .04	.72 (ř..... .40) (ɹ..... .22)

Order	Problem	Example	A	B	C	D	Mean Error
14	/ˆy/ as [Vi], not [Vɪ], etc.	hay	(«ay») aɪ..... .38 aɪ..... .54 að..... .08	(«aɪ») aɪ..... .24 aɪ..... .60 að..... .12 e..... .04	(«oy») oɪ..... .14 oɪ..... .86	(«oɪ») oɪ..... .38 oɪ..... .08 oð..... .12 ya & ye. .18 other... .24	.72
15	CaC(C)ˆ as [a], not [ə], etc.	todavía	a..... .26 ə..... .72 æ..... .02	a..... .34 ə..... .60 æ..... .06	a..... .34 ə..... .62 æ..... .02 ɨ..... .02	a..... .30 ə..... .48 æ..... .06 i..... .10 e..... .04 ye..... .02	.69 (ə..... .61)
16	Vřtˆ	divertido	ř..... .38 ɹ..... .40 ð..... .18 ž..... .02 ɹř..... .02	ř..... .46 ɹ..... .34 ð..... .16 ž..... .02 R..... .02	ř..... .18 ɹ..... .10 ð..... .66 R..... .06	ř..... .28 ɹ..... .38 ð..... .32 R..... .02	.68 (ɹ & ð. .64)
17	Vəˆ	olvidó	ə..... .34 d..... .56 ř..... .10	ə..... .48 d..... .36 ř..... .14 b..... .02	ə..... .26 d..... .74	ə..... .36 d..... .56 ř..... .08	.64
18	Vřˆ	marrón	r̃..... .66 ř..... .20 řɹ..... .02 hř..... .02 R..... .02 Rř..... .06 Rř..... .02	ř..... .36 ř..... .46 ɹ..... .02 ɹř..... .02 hř..... .04 R..... .06 Rř..... .04		ř..... .10 ř..... .84 ɹ..... .04 řɹ..... .02	.63 (ř..... .55) (ɹ..... .04)
19	ˆəV	luego	ə..... .40 g..... .58 b..... .02	ə..... .80 g..... .18 l..... .02	ə..... .30 g..... .68 k..... .02	ə..... .22 g..... .76 k..... .02	.57

Order	Problem	Example	A	B	C	D	Mean Error
20	/...o/+ /e.../ → /we/	encuentro en	we..... .36 o|e..... .64	we..... .90 o|e..... .10	we..... .28 o|e..... .72	we..... .26 o|e..... .74	.55
21	word-medial <b> as [β]	abuelo	β..... .28 b..... .72	β..... .76 b..... .06 v..... .16 other... .02	β..... .42 b..... .58	β..... .38 b..... .62	.54
22	áḍo	cansado	ð..... .60 ř..... .30 d..... .06 l..... .04	ð..... .36 ř..... .20 d..... .08 l..... .32 v..... .02 θ..... .02	ð..... .28 ř..... .66 d..... .04 β..... .02	ð..... .66 ř..... .24 d..... .10	.53
23	V̂C(C)as	palabras	a..... .78 ə..... .20 ɨ..... .02	a..... .64 ə..... .20 ɨ..... .16	a..... .26 ə..... .72 θ..... .02	a..... .34 ə..... .64 ɛ..... .02	.50 (ɛ..... .44)
24	V̂ntV	tanto	n..... .40 Ṽ..... .60	n..... .28 Ṽ..... .72	n..... .80 Ṽ..... .20	n..... .60 Ṽ..... .40	.48
25	/ey/as [eɨ], not [eɪ], etc.	seis	eɨ..... .78 eɪ..... .18 eð..... .04	eɨ..... .68 eɪ..... .16 eð..... .16	eɨ..... .32 eQ..... .32 ye..... .24 ee..... .04 other... .06	eɨ..... .32 eɪ..... .14 eð..... .28 ye..... .12 other... .14	.48
26	Vns V̂	cansado	n..... .78 Ṽ..... .22	n..... .40 Ṽ..... .60	n..... .70 Ṽ..... .30	n..... .68 Ṽ..... .32	.36
27	V̂tV	fritas	t..... 1.00	t..... .78 tʿ..... .22	t..... .40 tʿ..... .52 ř..... .02 other... .06	t..... .44 tʿ..... .48 ř..... .08	.35

Order	Problem	Example	A	B	C	D	Mean Error
28	...el	papel	l..... .74 ɬ..... .26	l..... .90 ɬ..... .10	l..... .32 ɬ..... .64	l..... .70 ɬ..... .30	.33
29	/á/ as [a], not [æ]	verano	a..... .60 æ..... .38 ɑ..... .02	a..... .94 æ..... .06	a..... .68 æ..... .32	a..... .48 æ..... .50 ð..... .02	.33 (æ..... .32)
30	⟨g⟩ as [h] or [X] and not as [ž], [ǰ], [g], etc.	Argentina	h & X... .92 ǰ..... .02 g..... .02 k & Xk.. .04		h & X... .74 ž..... .04 ǰ..... .02 g..... .10 k..... .04 ð..... .06	h & X... .38 ž..... .16 ǰ..... .08 g..... .32 k..... .04 y..... .02	.32 (ž, ǰ & g .25)
31	tře... as [ř]	trece	ř..... .74 ɹ..... .16 R..... .06 r̃..... .02 ž..... .02	ř..... .80 ɹ..... .10 R..... .04 r̃..... .04 ž..... .02	ř..... .68 ɹ..... .22 R..... .08 ð..... .02	ř..... .70 ɹ..... .10 R..... .08 ž..... .10 ɣ..... .02	.27 (ɹ & ž .19)
32	⟨h⟩ as ð	helado	ð.....1.00		ð..... 1.00	ð..... .20 h..... .76 đ & d... .04	.27 (h..... .25)
33	ař#	estudiar	ř..... .82 ɹ..... .14 R..... .02 ž..... .02	ř..... .72 ɹ..... .22 R..... .04 ð..... .02	ř..... .72 ɹ..... .24 R..... .04	ř..... .70 ɹ..... .24 ž..... .02 ð..... .02 řa..... .02	.26 (ɹ..... .21)
34	⟨z⟩ as [s]	empieza	s..... .88 z..... .12		s..... .78 z..... .14 ts..... .08	s..... .60 z..... .40	.25

Order	Problem	Example	A	B	C	D	Mean Error
35	/...a/+ /a.../ → /a/	la acción	a..... .96 a|a..... .04	a..... .98 a|a..... .02	a..... .60 a|a..... .40	a..... .56 a|a..... .44	.23
36	C$\underline{é}$řC...	cerca	e & ɛ... .74 ə..... .26	e & ɛ... .98 ə..... .02	e & ɛ... .74 ə..... .24 yə..... .02	e & ɛ... .72 ə..... .28	.21
37	<ñ> as [ñ]	champaña	ñ..... .92 ny..... .08	ñ..... .72 ny..... .28	ñ..... .84 n..... .16	ñ..... .76 n..... .22 ny..... .02	.19 (n..... .10)
38	V$\underline{ř}$V in cognates	americana	ř..... .74 ɹ..... .22 R..... .04	ř..... .92 ɹ..... .02 R..... .02 r̃..... .04	ř..... .76 ɹ..... .20 R..... .04	ř..... .92 ɹ..... .06 r̃..... .02	.17 (ɹ..... .13)
39	Cást... as [a], not [æ], etc.	lástima	a..... .92 æ..... .06 ɑ..... .02	a..... .88 æ..... .04 ɑ..... .04 ə..... .04	a..... .66 æ..... .28 ə..... .02 ɑ̃..... .04	a..... .92 ə..... .08	.16 (noncognates. .09)
40	V$\underline{s}$V in noncognates	cosen				s..... .86 z..... .14	.14
41	V$\underline{ř}$V	cara	ř..... .94 ɹ..... .04 R..... .02	ř..... .90 ɹ..... .02 R..... .02 d..... .06	ř..... .88 ɹ..... .08 R..... .04	ř..... .94 ɹ..... .04 R..... .02	.09 (ɹ..... .05)
42	V$\underline{ř}$V	verano	ř..... 1.00	ř..... .82 ɹ..... .06 R..... .06 r̃..... .02 ɹř..... .02 ð..... .02	ř..... .90 ɹ..... .04 R..... .04 r̃..... .02	ř..... .94 ɹ..... .04 R..... .02	.09 (ɹ..... .04)

Order	Problem	Example	A	B	C	D	Mean Error
43	⟨qu⟩ as [k]	queda	k & kʲ.. 1.00		k & kᶜ.. .98 kw..... .02	k & kᶜ.. .84 kw..... .16	.06
44	⟨j⟩ as [h] or [X]	jueves	h & X... .96 ð..... .04		h & X... .96 v..... .02 k..... .02	h & X... .94 ð..... .02 k..... .02 ɣ..... .02	.05 (ʃ & ž.. .00)
45	utterance-initial ⟨v⟩ as [b]	vamos	b..... 1.00		b..... .98 v..... .02	b..... .92 v..... .08	.03

CHART III

Other: 8B: aú... .06, að... .02. 8D: að... .08, aó... .08, aú... .04.
14D: oí... .20, uí... .04.
21B: X.... .02 (the word was abeja, so this is an assimilation).
25C: eí... .04, a.... .02. 25D: eí... .14.
27C: č.... .06 (the word was sitio).

The same NL phoneme may cause different degrees of difficulty in different environments. Thus, English /ə/ appears more often in the environment C_C(C)V (.61, problem 15) than in #C(C)_s, an ending (.44, problem 23), and even less frequently in C_rC (.21, problem 36). The same SL phoneme can also show different degrees of difficulty in different environments; thus, /ř/ is hardest to produce before a consonant (.68, problem 16), easier after a consonant (.27, problem 31) and in final position (.26, problem 33), and easiest intervocalically (.09, problems 41 and 42).

Some errors showed up that could not be predicted by contrastive analysis. A good example is 22B, where the most frequent erroneous rendition of the [ð] in /...ðo/ is [l] (.32). The fact that [l] is also a voiced continuant may help explain the error, though not fully, since [ð] also occurs in the environment #_V in English, as in <u>l</u>ather.

An interesting error is the rendition of intervocalic /ř/ as [ð] in problem 41B. A likely explanation is that the subjects perceived the Spanish [ř] in the native language, as an allophone of English /d/, and then went on to produce it according to Spanish distribution rules; that is, it seems to be a case of perception in the native language followed by production in the second language.

<u>Validation of the Hypotheses</u>

(1) The first hypothesis, concerning the different degrees of difficulty of the various types of problems, is generally confirmed, as the reader can see by comparing Chart II on page 2

with Chart IV on page 17. It should be noted that some of the ranking in Chart IV cannot be definitive without knowledge --not yet available, as far as the author knows-- of the frequency with which each phoneme (/ř/ is a good example) appears in each of its environments.

The apparent "sacredness" of the word boundary for English-speaking subjects should be noted. Distribution rules across word boundaries, whether they apply to allophones or phonemes, cause a greater percentage of errors (.81) than distribution rules within word boundaries (.51).

As to new allophones, if the influence of ‹v› is discounted (problem 2), [b̥] and [g̥] are about equal in difficulty (.68 and .66 respectively). Surprisingly, [d̥], even though it exists in English, presents a very similar degree of difficulty (.69) in the situations studied --problems 7 (17, 22).[6]

Of the two new phonemes tested, /ř/, as expected, proved to be much more difficult (.68, problems 13 and 18) than /ñ/ (.19, problem 37).

Of the English sounds mistakenly appearing in Spanish, the most persistent was [ə] (.42), followed by [v] (.35), [z] (.34), [ɹ] (.23), [æ] (.21), and [ž] or [ǰ] (.05).

Of the letters misinterpreted, ‹v› led the way (.35), with ‹z›, ‹h› and ‹g› not far behind (.25).

(2) The second hypothesis, which concerns spelling pronunciations, is statistically confirmed by the finding that the mean error of C + D (104.84) was significantly higher (at the .05 level of confidence) than the mean error of A + B (88.0) in

Mean of Error Means	Native Language: *English*	Second Language: *Spanish*	Conditions	Problems Included
.84	allophone	∅	when no other sound is affected	1, 4, 5
.81	new distribution rules across word boundaries			3, 6, 7, 10
.71	∅	allophone	-----	(2, 6, 21) (10, 19)
.64	phonetic difficulties			8-B, 9, 11, 14, 25
.51	new distribution rules within word boundaries			(2, 21) [16, 31, 33 (38,41,42)] (17, 22) 19, 27
.43	∅	phoneme	-----	(13, 18) 37
.39	∅	synalepha	-----	20, 35
.38	allophone	∅	when another sound is affected	(24, 26) 28
.27	phoneme	∅	-----	(2, 45) [(12, 40) 34] [13, 16, 18, 31, 33 (38,41,42)] (15, 23, 36) (29, 39) (30, 44)
.24	spelling misinterpretations			(2, 45) 30, 32, 34, 37, 43, 44

CHART IV

the 31 problems in which they could be paired (t=2.314). Significantly greater error means were also found in C vs. A ($p < .05$), D vs. A ($p < .01$) and D vs. B ($p < .05$). In other words, it is much harder to pronounce Spanish correctly when reading it aloud than when imitating it orally.

(3) The hypothesis that stated that sounds in cognate words would be mispronounced more frequently than those in noncognate words is confirmed by the limited data available for /ř/ (problems 38 vs. [41+42]), /s/ (12D vs. 40D) and /a/ (39C vs. 39D). Their mean difficulty in cognates was .33, in noncognates .08.

(4) Finally, the hypothesis that known words would be pronounced with more errors than unknown words is only partly confirmed by the data. While the mean error of A + C (100.39) is higher than that of B + D (92.45) in the 31 figures that could be paired, the difference comes close to, but does not attain, statistical significance (the t=1.68 obtained falls short of the t=2.04 required for statistical significance at the .05 level of confidence). Further experimental study of this hypothesis seems in order.

CONCLUSIONS

In general, problems involving the use or non-use of allophones are harder than those involving the use or non-use of phonemes. Moreover, difficulties depend partly on phonic environment (e.g., /ř/ before consonants harder than between vowels), on phonetic characteristics (e.g., /ř/ harder than /ñ/), on the interference of spelling (e.g., ‹v› interfering on [b]), on suprasegmental interference (e.g., [ə] more frequent in unstressed syllables), and on word boundaries (e.g., [g] harder initially than medially).

Spanish pronunciation drillbooks and beginning textbooks should include more drills on the pronunciation problems that have been found to be most persistent in this study; in particular, they should pay more attention to phonetic problems and to problems involving sound distribution rules across word boundaries. (Ideally, no sound would be produced in connected speech until its pronunciation has been learned.)

The Spanish language has a relatively good, mostly unidirectional fit between letters and sounds; however, this fact seems to be of benefit primarily to Spanish speakers --English speakers are very frequently misled by Spanish spelling into various types of pronunciation errors. However, since students of Spanish will read a great deal, Spanish pronunciation drillbooks and beginning textbooks should include, after the purely oral pronunciation drills, a thorough section with exercises (for reading aloud) designed to teach spelling-sound correlations. (Ideally, no letters would be read until their phonic symbolism has been learned.)

Pronunciation tests based on reading aloud do not present --since reading aloud is considerably harder than imitating-- a fair picture of a subject's command of pronunciation in speech.

Finally, since cognates increase --fourfold?-- the incidence of mispronunciations, it seems that they should be avoided as long as possible, certainly until after the students have acquired a good command of pronunciation both orally and when reading aloud.

Notes

[1] Robert P. Stockwell and J. Donald Bowen, The Sounds of English and Spanish (Chicago: University of Chicago Press, 1965), pp. 9-18.

[2] Eugène J. Brière, "An Investigation of Phonological Interference," Language, Vol. XLII, No. 4 (December, 1966), pp. 768-796.

[3] J. Donald Bowen and Robert P. Stockwell, Patterns of Spanish Pronunciation --A Drillbook (Chicago: University of Chicago Press, 1960).

[4] Hector Hammerly, "And Then They Disbelieved Their Ears," Hispania, Vol. 53, No. 1 (March 1970), pp. 72-75.

[5] Where computations of statistical significance were needed, the author is indebted to Professor Cesario Villegas of the Dept. of Mathematics, S.F.U., for his advice, and to Mrs. Constance E. Dwyer of the Statistical Laboratory, Dept. of Mathematics, S.F.U., for carrying out the computations.

[6] The parentheses around 17 and 22 signify that the mean errors of these two problems were averaged separately before averaging the result with the mean error of problem 7 --that is, the formula was $\frac{7 + \left(\frac{17 + 22}{2}\right)}{2}$. The parentheses and brackets under "Problems Included" in Chart IV (page 17) and on page 18 have the same function.